REMARKS/ARGUMENTS

Claims 1-27 are pending in the application. Claims 1-27 are rejected. No new matter has been introduced. In view of the foregoing amendments and the following remarks, Applicants respectfully request allowance of Claims 1-27.

PRIOR ART REJECTIONS

Claims 1-4 and 8-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hui, US Pat. No. 6,654,417 in view of Ribas-Corbera et al., (hereinafter "Ribas-Corbera"), US Pat. No. 6,111,991. Claim 5 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hui, in view of Ribas-Corbera and further in view of Vogel, US Pat. No. 5,343,247. Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hui, in view of Ribas-Corbera and further in view of Suzuki, US Pat. No. 6,937,656. Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsia, US Pub. No. 2004/0146108) in view of Ribas-Corbera and further in view of Sugiyama, US Pat. No. 6,940,911. Claims 15-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsia in view of Ribas-Corbera. Claims 17-19 and 20 are rejected under 35 U.S.C. § 103(a)as being unpatentable over Hsia, Ribas-Corbera, and further in view of Mitchell et al., (hereinafter "Mitchell"), US Pat. No. 6,256,422. Claim 18 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsia in view of Ribas-Corbera in view of Mitchell and further in view of Hui. Claims 21-27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hui in view of Hsia.

CLAIMS 1-14 DEFINE OVER THE PRIOR ART

Independent claim 1 recites, in part:

> generating a first quantizer estimate for the picture ***based on a fullness indicator*** from a transmit buffer of a video coder,
>
> generating a second quantizer estimate for the picture ***based on*** **[1]** ***a linear regression of quantizer assignments*** made to prior pictures of a same type, **[2]** actual coding rates achieved by such quantizer assignments and **[3]** the target bitrate, and
>
> selecting a quantizer ***based on a difference between the two quantizer estimates*** and based on the estimate of the picture's complexity.

The cited art, even if considered in combination, does not teach or suggest the rate control method recited in claim 1. Claim 1 by its own terms requires generation of two quantizer estimates each based on different sets of data, then selection of a final quantizer based on a

comparison of the two estimates. No reference contains any disclosure to select a quantizer based on a comparison of two quantizer estimates as claimed.

The Office Action asserts that Hui discloses a second quantizer estimate at Col. 9:38-43 where it states:

> Adaptive quantization 218 may be applied in which the determined QS_{ref} is scaled according to the local activities of the MB as generated by MB activity calculation process 216 and the average MB activity of the previously coded (or optionally current picture) as produced by the frame activity average process 217. Example implementations of the MB activity calculation 216, frame activity average 217, and adaptive quantization process 218 are found in MPEG-2 TM5. The output quantization stepsize (QS) is used to quantized DCT coefficients of the MB.

This disclosure does not meet the substance of claim 1, which requires that the second quantizer estimate be generated from **[1]** a linear regression of quantizer assignments made to prior pictures of a same type, **[2]** actual coding rates achieved by such quantizer assignments and **[3]** the target bitrate. Here, Hui's disclosure refers to macroblock activity, not any of the three types of data referenced in pending claim 1. The Office Action has admitted that Hui does not disclose linear regression techniques and referred to Ribas-Corbera for such disclosure. However, Hui's reference to macroblock activity does not correspond to portions [2] or [3] recited above and the Office Action has made no attempt to explain such deficiencies.

Claim 1 goes further and requires a comparison of the two quantizer estimates – "selecting a quantizer ***based on a difference between the two quantizer estimates*** and based on the estimate of the picture's complexity." Hui has no disclosure corresponding to this element, either. Although the Office Action refers to Hui, Col. 9:38-43 for disclosure of a second quantizer estimate, Hui clearly states the QS_{ref} is ***scaled*** according to local activities of a macroblock. Hui discloses no comparison or ***difference calculation*** for this scaling operation. The undersigned reviewed the other portions cited by the Office Action, Col. 3:64-65, Col. 12:24-33, Cols. 7:61-8:11 and the figures, but has found nothing to disclose any difference taken between two separate quantizer estimates. The cited art simply does not teach or suggest this subject matter.

Ribas-Corbera is cited for disclosure of linear regression in the abstract. Ribas-Corbera has no disclosure of a quantizer estimate that is generated from **[1]** a linear regression of quantizer assignments made to prior pictures of a same type, **[2]** actual coding rates achieved by such quantizer assignments and **[3]** the target bitrate. Moreover, Ribas-Corbera has no

disclosure of a difference taken between two quantizers as claimed. Accordingly, this art, even if considered in combination, fails to teach or suggest all elements of claim 1.

Claim 1 is allowable over the cited art. Claims 2-14 depend from independent claim 1 and, therefore, are allowable for at least the reasons applicable to claim 1, even before they are considered on their merits.

CLAIM 4 DEFINES OVER THE PRIOR ART

Claim 4 recites:

> The rate control method of claim 1, wherein the estimate of the picture's complexity is determined by analyzing a number of bits used to represent each pixel in the picture.

The combination of Hui and Ribas-Corbera does not teach or suggest determining an estimate of picture complexity by analyzing a ***number of bits*** used to represent each ***pixel*** in the picture, which estimate is used to influence the selection of a quantizer.

For at least these reasons, Applicants believe that the rejection of claim 4 should be reconsidered and withdrawn.

CLAIM 5 DEFINES OVER THE PRIOR ART

Dependent claim 5 recites:

> The rate control method of claim 1, further comprising selectively canceling transform coefficients of coded blocks in the picture according to a rate control policy selected for the picture.

The combination of Hui, Vogel and Ribas-Corbera does not teach or suggest the rate control method recited in claim 5. The Examiner cites the following sentence of Vogel as teaching the subject claim: "Subsequently, the action of the transform unit 403 is cancelled by a unit 406 with the quantized sampling values." (Vogel, Col. 3, lines 61-63). Applicants respectfully disagree. Nothing in that sentence, or indeed anywhere in Vogel, teaches or suggests ***selectively*** canceling transform coefficients of coded blocks in the picture ***according to*** a ***rate control policy*** selected for the picture.

For at least these reasons, Applicants believe that the rejection of claim 5 should be reconsidered and withdrawn.

CLAIM 6 DEFINES OVER THE PRIOR ART

Dependent claim 6 recites:

> The rate control method of claim 1, further comprising selectively canceling motion vectors of coded blocks in the picture according to a rate control policy selected for the picture.

The combination of Hui, Suzuki and Ribas-Corbera does not teach or suggest the rate control method recited in claim 6. The Examiner cites the following passage from Suzuki as teaching the subject claim:

> Since fine quantization is performed when the quantizing parameter QP is small, the above operation matches a tendency that the reduction effect of the amount of motion vector information is canceled by the increased amount of the coding information of the DCT coefficients.

(Suzuki, Col. 9, lines 14-19). Applicants respectfully disagree. The passage merely notes that the reduction effect of the amount of motion information is canceled by the increased amount of coding information of the DCT coefficients, which is not the same thing as ***selectively*** canceling motion vectors of coded blocks in the picture ***according to*** a ***rate control policy*** selected for the picture.

For at least these reasons, Applicants believe that the rejection of claim 6 should be reconsidered and withdrawn.

CLAIM 8 DEFINES OVER THE PRIOR ART

Dependent claim 8 recites:

> The rate control method of claim 1, further comprising selecting a coding mode for blocks of the picture according to a rate control policy selected for the picture.

The combination of Hui and Ribas-Corbera does not teach or suggest the rate control method recited in claim 8. The passage of Hui cited by the Examiner as disclosing the subject claim does little more than recite descriptions of *I, P,* and *B* picture types; it does not teach ***selecting*** a coding mode for blocks of the picture ***according to a rate control policy selected for the picture***. (Hui, Col. 5, lines 58-67).

For at least these reasons, Applicants believe that the rejection of claim 8 should be reconsidered and withdrawn.

CLAIMS 15-20 DEFINE OVER THE PRIOR ART

Independent claim 15 recites:

A rate controller, comprising:

a scene content analyzer having an input for source video data and an output for complexity indicators representing complexity of each picture in the source video data,

a first quantizer estimator having an input for the source video data and complexity indicators, to generate a quantizer estimate of a picture based on a calculation of a target rate for coding the picture,

a second quantizer estimator having an input for the complexity indicators and past values of quantizer selections and coding rates achieved therefrom, the second quantizer estimator to generate a second quantizer estimate for the picture based on a linear regression modeling of the prior quantizer selections and coding rates for like-kind pictures, and

a coding adapter, having inputs for the two quantizer estimates and the complexity indicators to select a quantizer for the picture based on a difference of the two quantizer estimates.

The combination of Hsia and Ribas-Corbera does not teach or suggest the rate controller as recited in claim 15. The Examiner cites the Scene Detection Module, Quantization Decision Module, and Picture Type Decision Module of FIG. 3 as disclosing the scene content analyzer, however, none of these modules discloses an output for complexity indicators representing complexity of each picture in the source video data. (Hsia, FIG. 3, paras. 44-46). The Picture Type Decision Module outputs the picture type of the current frame (Hsia, FIG. 3, para. 43); the Quantization Decision Module outputs a quantization scale for each slice (Hsia, para. 44); and the Scene Detection Module outputs either a low or high scd signal depending on whether a scene change is detected (Hsia, FIG. 3, paras. 43 and 45).

The Examiner asserts also that Hsia's Quantization Decision Module discloses both the first and second quantizer estimators of the subject claim. Applicants respectfully disagree. First, the Quantization Decision Module is concerned with quantization scales for ***slices of pictures***, and not quantization estimates of ***pictures***. Moreover, the Quantization Detection Module outputs only a single quantization scale (i.e., *Q_Slice*) for each slice, not ***two***, separately-derived quantization estimates for each picture as is recited in the subject claim. (Hsia, para. 44). Second, the Quantization Decision Module does not have an input for the complexity indicators and past values of quantizer selections and coding rates achieved therefrom.

As with independent claim 1, the Examiner asserts that the linear regression element is taught or suggested by Ribas-Corbera. For reasons similar to those applicable to claim 1, Applicants respectfully disagree.

Finally, Hsia does not teach a coding adapter, having inputs for the two quantizer estimates and the complexity indicators to select a quantizer for the picture based on a difference of the two quantizer estimates. While the Scene Change Detection block of the Scene Detection Module takes two quantizer values as two of its four inputs, neither of these is either of the quantizer estimates as claimed, and the Scene Change Detection block does not select a quantizer for the picture based on a difference of the two quantizer estimates, but rather determines whether there has been a scene change. (Hsia, FIG. 3, para. 45).

For at least these reasons, Applicants believe that the rejection of claim 15 should be reconsidered and withdrawn. Claims 16-20 depend from independent claim 15 and are allowable for at least the reasons applicable to claim 15, as well as due to the features recited therein.

CLAIM 17 DEFINES OVER THE PRIOR ART

Dependent claim 17 recites:

> The rate controller of claim 15, wherein the coding adapter comprises:
> a subtractor having inputs for the two quantizer estimates, and
> a clipper coupled to an output of the subtractor.

The combination of Hsia, Mitchell and Ribas-Corbera does not teach or suggest the rate controller recited in claim 17. The Examiner cites the Scene Detection Module in FIG. 3 of Hsia as teaching a subtractor having inputs for two quantizer estimates, however, the only block shown in the Scene Detection Module as having inputs for two quantizer estimates is the Scene Change Detection block, which ***detects a scene change*** – it is not a ***subtractor***. (Hsia, FIG. 3, para. 45).

Also, the Examiner cites FIG. 11(a) of Mitchell as teaching a clipper coupled to an output of the subtractor, however, Mitchell actually shows the opposite structure (i.e., the output of a "clipper" as an input to a "subtractor"). (Mitchell, FIG. 11(a), Col. 13, lines 28-61).

For at least these reasons, Applicants believe that the rejection of claim 17 should be reconsidered and withdrawn.

CLAIM 20 DEFINES OVER THE PRIOR ART

Dependent claim 20 recites:

> The rate controller of claim 15, wherein the coding adapter comprises a lookup table indexed by a complexity indicator representing complexity of the picture and the picture's coding type.

The combination of Hsia, Mitchell and Ribas-Corbera does not teach or suggest the rate controller recited in claim 20. The Examiner cites the following from Mitchell as teaching a lookup table indexed by a complexity indicator representing complexity of the picture and the picture's coding type:

> The quantization described in the background is the linear quantization used in international image data compression standards such as JPEG and MPEG. There is no requirement that the quantization be linear. Any mapping that reduces the number of transform data levels in a deterministic way can be used with this invention. [...] Actual embodiments may use a lookup table or a sequence of comparisons to achieve similar results.

(Mitchell, Col. 6, lines 26-34). Nowhere in Mitchell is it taught that the lookup table is indexed by a ***complexity indicator representing complexity of the picture and the picture's coding type***.

For at least these reasons, Applicants believe that the rejection of claim 20 should be reconsidered and withdrawn.

CLAIMS 21-26 DEFINE OVER THE PRIOR ART

Independent claim 21 recites:

> A method for identifying a scene change from a sequence of video data, comprising:
>
> for a plurality of macroblocks of an input picture, computing variances of a plurality of blocks therein,
>
> **comparing minimum variance values of the plurality of macroblocks to corresponding minimum variance values of macroblocks from a prior picture,**
>
> calculating an activity level of the input picture from the variances,
>
> comparing the activity level of the input picture to an activity level of the prior picture, and
>
> **generating a scene change decision from the two comparisons.**

The combination of Hui and Hsia and does not teach or suggest the method for identifying a scene change as recited in claim 21. In particular, the combination of Hui and Hsia does not teach at least comparing minimum variance values of the plurality of macroblocks to corresponding minimum variance values of macroblocks from a prior picture; or, generating a scene change decision from the two comparisons. Nowhere in Hui is it taught to compare ***minimum*** variance values of the plurality of macroblocks to corresponding ***minimum*** variance values of macroblocks from a prior picture. Further, Hsia fails to teach generating a scene change decision from the two comparisons as described in the subject claim. Therefore, the combination of Hui and Hsia fails to teach or suggest each and every element of claim 21.

Applicants note that dependent claims 22-24 recite explicitly the ***minimum*** variance values of claim 21, with respect to comparisons thereof and their use in calculating activity levels.

For at least these reasons, Applicants believe that the rejection of claim 21 should be reconsidered and withdrawn. Claims 22-26 depend from independent claim 21 and are allowable for at least the reasons applicable to claim 21, as well as due to the features recited therein.

CLAIM 27 DEFINES OVER THE PRIOR ART

Independent claim 27 recites:

A scene change detector, comprising:

a variance calculator to calculate a plurality of variance values for each macroblock in a source image,

a minimum variance selector to select a minimum variance value for each macroblock,

a memory to store minimum variance values of a previously processed image,

a comparator to compare the minimum variance values of the source image to the minimum variance values of the previously processed image,

an averager to calculate an average variance value for each macroblock,

an activity calculator to calculate an activity level of the source image from the average variance values, and

decision logic to signal a scene change based on a comparison of an output from the comparator and the activity level of the source image.

The combination of Hui and Hsia does not teach or suggest the scene change detector as recited in claim 27. In particular, the combination of Hui and Hsia does not teach at least a minimum variance selector to select a minimum variance value for each macroblock. As discussed above in conjunction with claim 21, nowhere in Hui is a ***minimum*** variance selector taught to select a ***minimum*** variance value for each macroblock. Similarly, Hui also does not teach a memory to store ***minimum*** variance values of a previously processed image, or a comparator to compare the ***minimum*** variance values of the source image to the ***minimum*** variance values of the previously processed image.

Furthermore, Hsia fails to teach decision logic to signal a scene change based on a comparison of an output from the comparator and the activity level of the source image. The Examiner cites Hsia's Picture Type Decision Module as teaching this element, however Applicants fail to find such a showing. (Hsia, FIG. 3). As described in paragraph 43 of Hsia, the Picture Type Decision Module takes ***as an input*** a signal from the Scene Detection Module indicating that a scene change has been detected; it does not output such a signal. The Scene Detection Module of Hsia does signal a scene change, however, said signal is not based on a comparison of an output from the comparator and the activity level of the source image, as described in the claim. (Hsia, FIG. 3, para. 45).

For at least these reasons, Applicants believe that the rejection of claim 27 should be reconsidered and withdrawn.

CONCLUSION

In view of the above amendments and arguments, it is believed that the above-identified application is in condition for allowance, and notice to that effect is respectfully requested. Should the Examiner have any questions, the Examiner is encouraged to contact the undersigned at (408) 975-7963.

The Commissioner is authorized to charge any fees or credit any overpayments which may be incurred in connection with this paper under 37 C.F.R. §§ 1.16 or 1.17 to Deposit Account No. **11-0600**.

Respectfully submitted,

Date: December 15, 2008

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